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Theories of Safety Management

safety management concepts series

UNITED STATES ARMY SAFETY CENTER ■ FORT RUCKER, ALABAMA

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Section I. THE ROLE OF THE SAFETY FUNCTION

"What is the purpose or objective of the safety function?" is certainly the most basic question the safety manager must answer. Although it is basic, there is by no means universal understanding or agreement within the ranks of Army safety professionals regarding the role of the Army safety program. AR 385-10 does contain an explicit set of goal and objective statements that provide definitive guidance. This guidance is quoted in figure 1.

FIGURE 1

The Goal

Para 1-4a, AR 385-10:

> Reduce and keep to a minimum accidental manpower and monetary losses, thus providing more efficient use of resources and advancing the combat effectivensss of the Army.

Para 1-4b, AR 385-10:

> Provide a safe and healthful environment at all times for all Army personnel and others exposed at Army operations.

The Objectives

Para 1-5a, AR 385-10:

> Prevention of injury and occupational illness minimizes frequency and severity of injuries and occupational illnesses resulting from Army operations. It thus improves employee morale and efficiency and minimizes the cost associated with loss production compensation payments, sick leave usage, and other related expenses.

Para 1-5b, AR 385-10:

> Damage control aims at detecting and eliminating the causes of preventable, inadvertent damage to Army and non-Army property as a result of Army operations.

Para 1-5c, AR 385-10:

Accident prevention involves the use of special techniques to detect unsafe behavior and conditions and prevent accidents.

Para 1-5d, AR 385-10:

Compliance with statutory and regulatory requirements uses the specialized experience of the safety staff to ensure consistent, economical compliance with applicable safety requirements of Federal statutes, Army regulations, host nation, and Status of Forces Agreements.

Para 1-5e, AR 385-10:

Liability limitation involves prompt and prudent action to reduce the likelihood of liability against the Army.

Para 1-5f, AR 385-10:

Occupational health involves implementing AR 40-5 to ensure the physical and mental health of all personnel in cooperation with safety personnel.

These objectives were not selected by random chance. They were derived from analysis of the Army's mission and of the contribution the safety program can make to this mission. Figure 1 depicts the Army commander's six basic missions and shows where each safety program objective makes its contribution. It is interesting to note how significant the safety contribution is to the varied aspects of the command mission. In terms of mission support, the output of each of the safety program outputs is highly significant considered against the contribution of other staff sections. Appendix A contains the objectives developed into an overall outline including goal statements, tasks, and tactics. The significance of a multi-output program of this character in terms of command visibility, prestige, etc. should not be underestimated.

Section II. UNDERSTANDING ACCIDENT CAUSATION

1. AN HISTORICAL VIEW OF ACCIDENT CAUSATION. In order to successfully design and manage an effective accident prevention program, it is first necessary to understand what causes accidents. The unexplained, hurtful happenings which are now referred to as accidents probably concerned primitive man also. An early tribesman walking through the forest who had a tree limb fall on his head and give him a painful bump could only rationalize that, for some reason, the tree spirit was angry with him and was punishing him. The primitive man would then try to think of something nice he could do for the tree spirit so that the tree would no longer be angry with him. For many centuries this approach was predominant. Later a little more sophisticated view was accepted--the person injured was somehow at fault. He was at fault because he should be "punished" or because he was "careless" or because he was "stupid." Whatever rationale there was behind the explanation, it centered on the person injured; on the fact that he could have avoided it with some sort of action on his part.

a. During the early industrial revolution workers who were injured in factories, so reasoned factory managers, were hurt because they weren't "careful." That was a comfortable approach for managers to take because it was obviously unnecessary for them to do anything about accidents since it was up to people to protect themselves. Accidents were considered a natural side effect of production and there was no need to worry about them since, as everyone knew, there was no way to change human nature--people always had been and always would be careless.

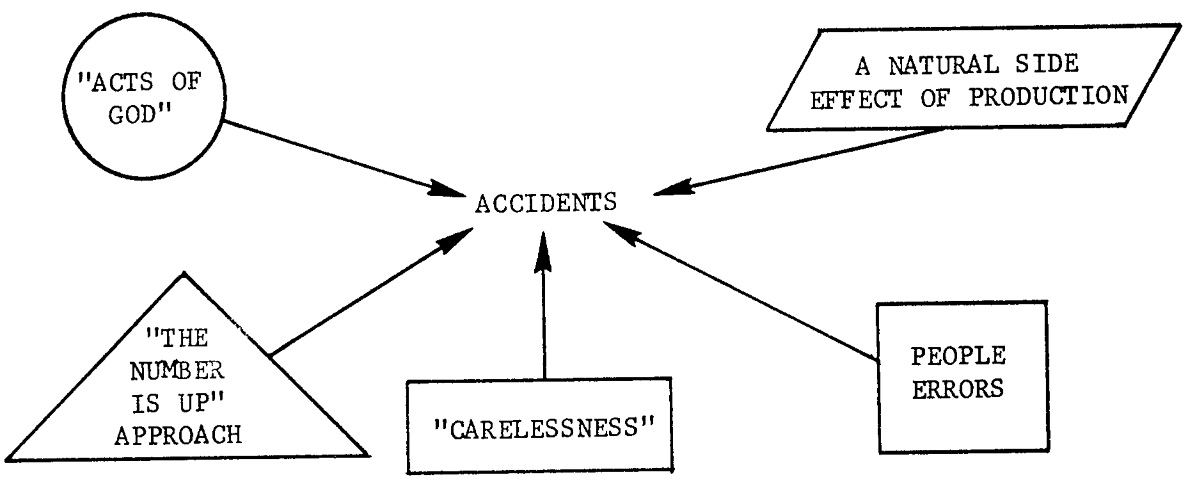


FIGURE 2

b. This view of individual responsibility for safety in the industrial setting was upheld to a large extent in the courts--there were no laws forcing compensation pay unless the unjured worker sued his employer and actually won. Winning was also rather rare for an injured worker because, under the common law of the time, the employer had to be found <u>completely</u> to blame for negligence. But public opinion began to rise against the "worker-alone-is-to-blame" theory and the courts gradually responded by being more responsive to workers' claims. State legislatures began to follow suit and enact laws which placed more and more financial responsibility upon the employer of an injured worker; every State had an employer's liability law by 1908.

c. Employers who would have financial responsibility for an injured worker began to see that, financially at least, it would be worth their while to <u>prevent</u> accidents if possible rather than pay for them. Since there was no organized theory of what causes accidents, other than personal carelessness on the part of the worker, there was no organized plan by employers on how to prevent accidents. Individual businesses and factories used a hit-or-miss kind of effort in designing a safety program. Most of these efforts were ineffective in varying degrees.

2. THE HEINRICH THEORY. Into this mish-mash of disordered accident prevention stepped a man named H. W. Heinrich who, in 1931, published a book called "Industrial Accident Prevention, A Scientific Approach." Since the Heinrich model of accident causation has been the basic approach in accident prevention and has been used mostly by safety societies and professional people since its publication in 1931, it is necessary to take a fairly indepth look at this "scientific approach."

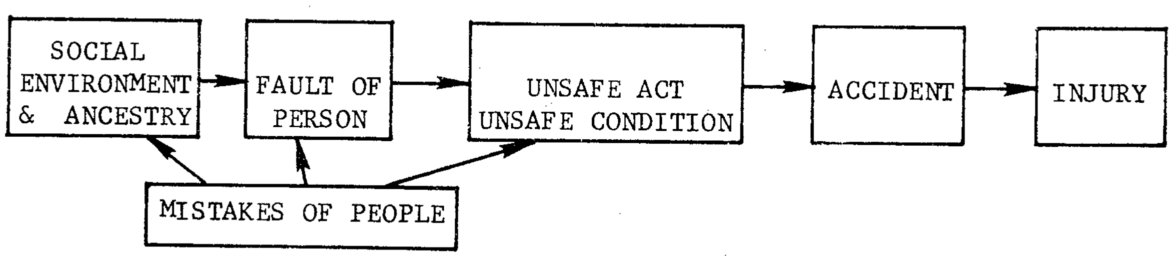


FIGURE 3

a. Heinrich began with the fact of injury and traced it back to its causes (figure 3, read from right to left). An injury, he reasoned, was caused by an accident, and an accident was caused by either an unsafe act on the part of the injured person or an unsafe condition in the environment. This was a major breakthrough in the safety profession because it removed some of the blame from an individual worker. An accident might indeed be caused because a worker was "careless" but it might also have been caused because the machine the worker was given to work with was poorly designed or maintained and therefore made it likely that whoever worked with it would be injured.

b. Managers could see the rationale behind this theory--it made sense to them and they jumped on the bandwagon. Since one of Mr. Heinrich's remedies against accidents had to do with "things" instead of people, this gave employers something concrete to correct. Machines and business and factory layouts were looked at with a new eye and were found to be sadly lacking in safety features. A big push began to engineer for safety. This engineering for safety has been marvelously effective and is still a big area of safety responsibility under the new Occupational Safety and Health Act (OSHA).

c. However, engineering out unsafe conditions was only part of Mr. Heinrich's corrective action sequence. The other three were: instruction, in which workers were taught how to do their particular job safely; persuasion and appeal, in which people were exhorted to behave safely and which prompted all those reams of paper being used for posters; and discipline, in which, when all else has failed, a worker was threatened with loss of money or job if his safety performance did not improve. From these corrective actions of Heinrich's have come the famous three "E's" of accident prevention: Engineering, Education, and Enforcement. Basically, every branch of the safety profession designs and manages their safety efforts along these lines--engineer for safety, educate the worker, and, when nothing else works, enforce penalties against wrong-doers.

d. Although Mr. Heinrich had taken a giant step forward by developing a model of accident causation and by recognizing the importance of unsafe conditions as accident causative factors, still the major and supposedly uncorrectable fault for accidents was left resting firmly on the individual and his careless unsafe act. The next step back in Heinrich's accident causation model again places blame squarely on the individual and then, in the next step, makes a vague reference to the person's social environment and ancestry as the causation reason for his "carelessness" or fault. Since managers then and now realize full well that there wasn't a whole lot that could be done about a worker's social environment and ancestry, they were left with aiming corrective action at those points on Heinrich's model which could reasonably be expected to yield some results, especially on the unsafe act/unsafe condition block.

e. Until very recently, the Heinrich theory of accident causation was the only well-known, workable theory upon which to base a safety program. And stepping as it did into a vast wasteland of hit-or-miss safety effort, it was very effective. Injury rates did drop drastically for many years; recently rates have again begun to creep up. Because of this slow but steady increase in the number of accidents and injuries, it is perhaps time to develop a new causation model of accidents and to redesign our safety efforts around a more viable causation model.

3. A NEW ACCIDENT CAUSATION CONCEPT. The Department of the Army has developed an accident causation model that does a better job of depicting the causes of accidents. It is a little more complicated than Heinrich's model, but I think we can demonstrate that it does a lot more for us in helping us to understand how accidents are caused and how to correct those causes. We are interested in your comments.

Note below that what Heinrich identified as INJURY has been called RESULT, indicating that it can involve damage as well as personal injury and that the result can range from the very minor to the very severe. The term MISHAP has been used rather than Heinrich's ACCIDENT to avoid the popular misunderstanding that an accident necessarily involves injury or damage. Finally, the term OPERATING ERROR has

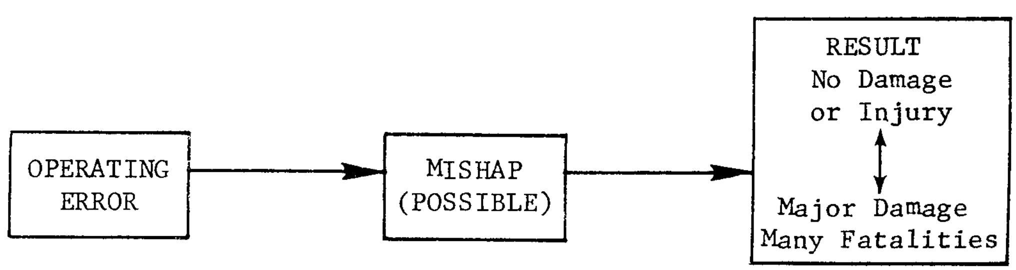


FIGURE 4

been substituted for UNSAFE ACT & UNSAFE CONDITION to better reflect the fact that both are essentially the same thing, resulting from mistakes made by individuals.

The Department of the Army causation model parallels Heinrich's to this point, changing only a few items to improve understanding. Examples of operating errors include:

a. Taking an unsafe position.

b. Stacking supplies in unstable stacks.

c. Poor housekeeping.

d. Removing a guard.

The Causes of Operating Errors

It is here, when we add the consideration of systems defects, that we break away from Heinrich and add a concept that virtually revolutionizes accident prevention work. We believe this key concept, developed primarily by Mr. William C. Pope, is the single most important concept yet developed in accident prevention theory. It changes <u>what</u> we seek to do and <u>how</u> we do it.

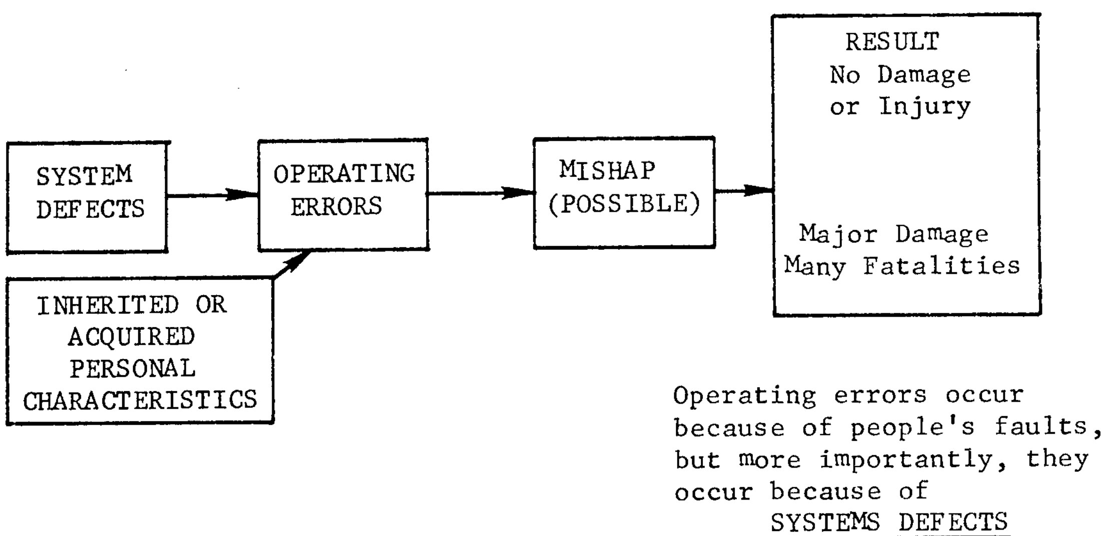


FIGURE 5

WHAT IS A SYSTEM DEFECT?

System defects are weaknesses in the way the system is designed or operated. Typical examples of systems defects include:

a. Improper assignment of responsibility.

b. Creation of an improper climate of motivation.

c. Inadequate provisions for training and education.

d. Poor provisions for providing suitable equipment and supplies.

e. Improper procedures for selection and assignment of personnel.

f. Improper allocation of funds.

Adding Management Error

We need not stop in our discussion of causation with the systems defect. We can ask, "What causes systems defects?" The answer is management errors, because managers are the people who design systems.

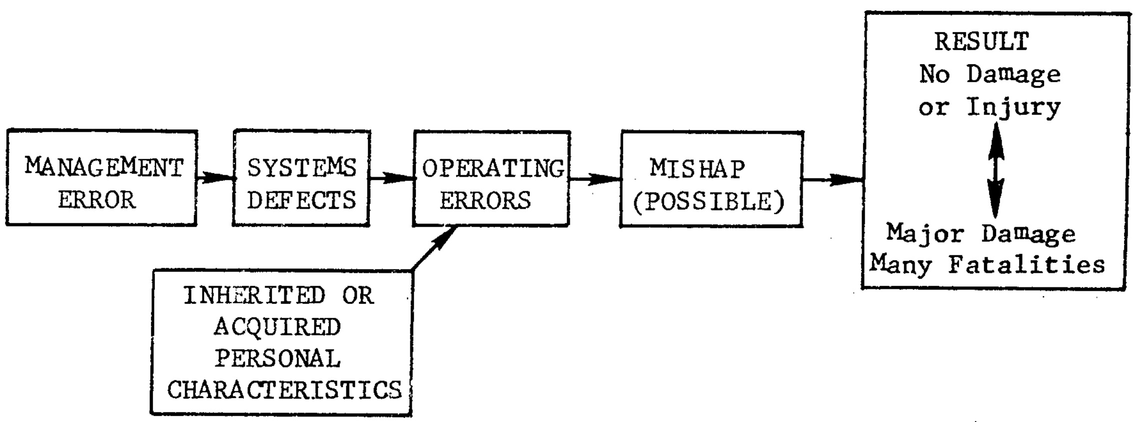
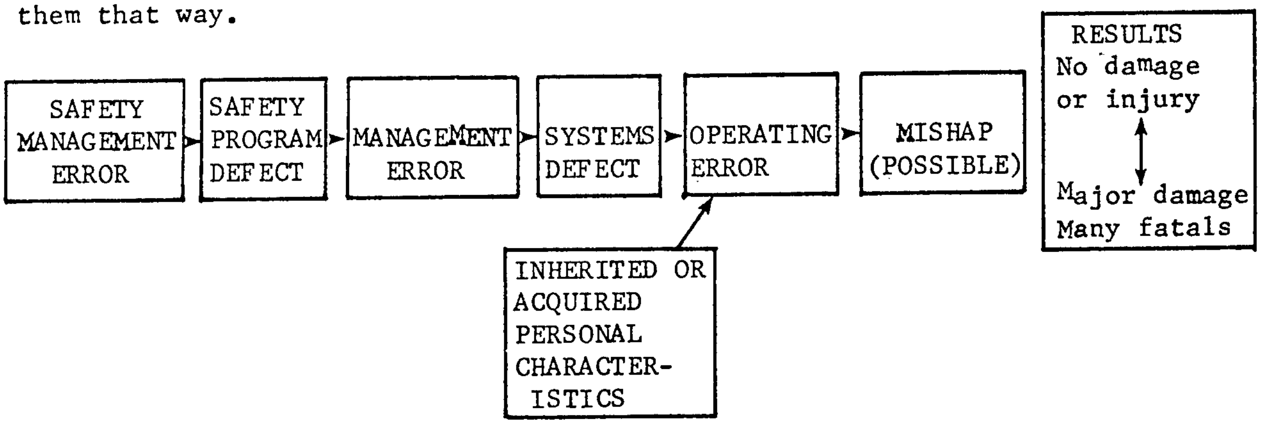


FIGURE 6

The Safety Program's Role

In organizations without a safety staff, the buck stops with the manager. However, if the organization has a safety staff, we can answer the question "Why did the manager make the error?" by answering, "Probably because he was poorly supported by the safety program responsible for advising him on safety matters." We can further conclude that when safety programs are weak and ineffective, it is generally because safety managers make them that way.



Safety Management Error. A weakness in the knowledge or motivation of the safety manager that permits a preventable defect in the safety program to exist.

Safety Program Defect. A defect in some aspect of the safety program that allows an avoidable management error to exist. Examples:

1. Ineffective information collection

2. Weak causation analysis

3. Poor countermeasures

4. Inadequate control

FIGURE 7

Countermeasure Potential

The Department of the Army causation approach opens <u>eight</u> avenues through which we can initiate countermeasures. None of these areas overlap and they open so many effective countermeasures to the safety manager that a major problem becomes selecting the best total combination consistent with available resources.

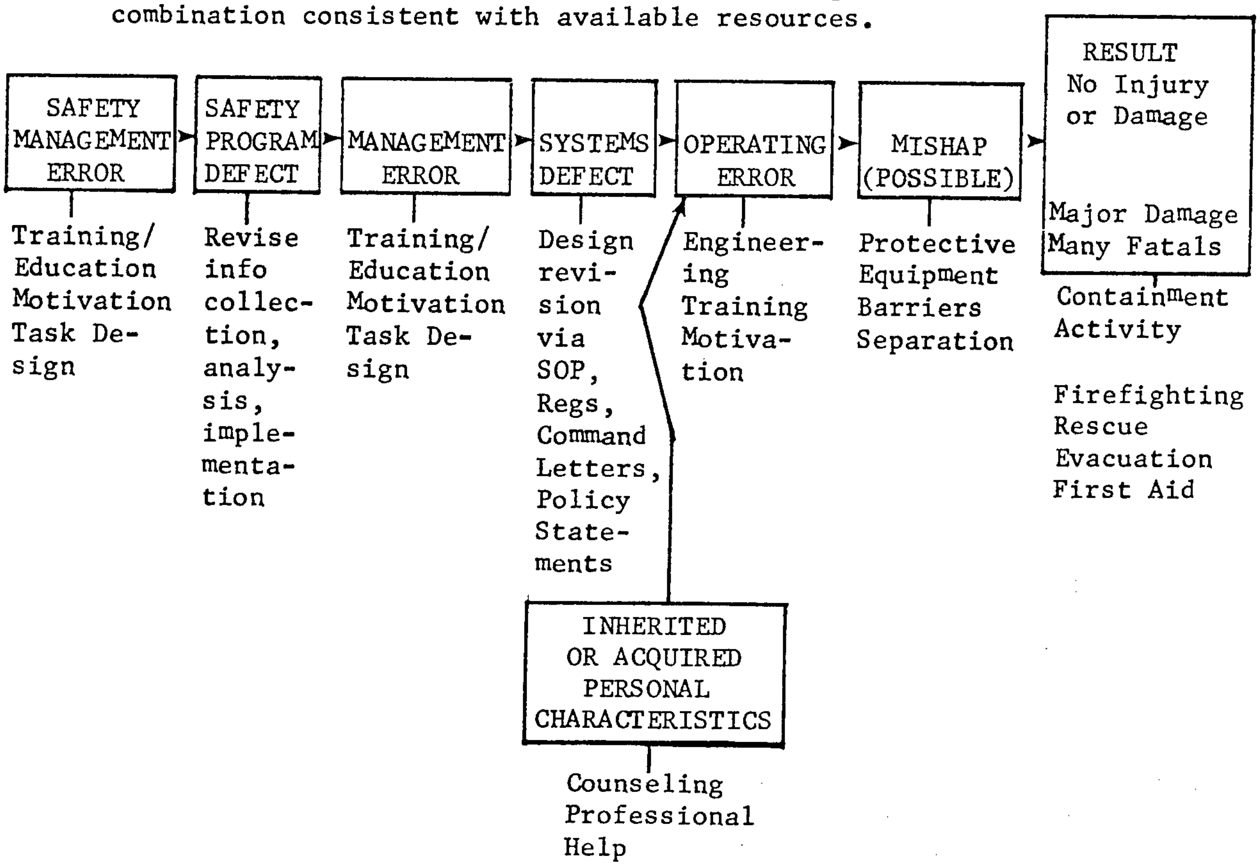


FIGURE 8

DEPARTMENT OF ARMY CAUSATION MODEL VERSUS HEINRICH'S

1. Department of Army model stresses the variability of result, Heinrich's doesn't.

2. Department of Army model identifies the possibility, not inevitability, of the accident or mishap.

3. Department of Army model stresses the identity of unsafe acts and unsafe conditions, calling both OPERATING ERROR.

4. Department of Army model identifies the system origin of operating errors, an aspect totally overlooked in Heinrich's model.

5. Department of Army model establishes the staff role of the safety manager and recognizes his responsibility to line management.

6. Department of Army model opens eight points of attack compared to Heinrich's two.

7. Department of Army model provides channels for countermeasures activity that produce substantial system benefits in morale, efficiency, and productivity, in addition to improved accident prevention.

CONCLUSIONS

1. Given enough data the outcome of a mishap is not chance, but is predictable.

2. All mishaps result from hazardous situations created by operating errors, all of which involve the acts of people. Thus all unsafe acts are committed by people and all unsafe conditions are created by acts of people. Unsafe acts create unsafe conditions and unsafe conditions permit unsafe acts.

3. Operating errors are caused by two factors. Personality defects of people about which we can do very little in practical terms, and systems defects which we can do a great deal about.

4. Systems defects arise because systems designers (i.e., line management) don't have the expertise to avoid making management errors. That is why they hire safety staff.

5. Safety staff exists for one reason only, to advise line management on the design and operation of a safety system.

6. It follows that more management errors resulting in preventable losses are made because the safety program was ineffective in providing advice to line management.

MOST PREVENTABLE ACCIDENTS ARE THE MORAL RESPONSIBILITY OF THE SAFETY MANAGER AND ARE MONUMENTS TO HIS FAILURES.

7. In summary, the safety manager's sole job is designing a safety system the sole output of which is advising management on ways to eliminate the causes of operating errors. Not how to eliminate accidents, not how to eliminate operating errors, but rather how to eliminate the management rooted causes of operating errors. Our new causation model is fully consistent with, and supports, this approach.

4. VIEWING AN ORGANIZATION AS A SYSTEM. A system is simply a group of interrelated parts which, when working together as they were designed to do, accomplish a goal--movement from one place to another. There are, of course, many subsystems within a total system; as in the car, there is the braking subsystem, the ignition subsystem, and so forth. If any one of these subsystems within the total system of the automobile malfunctions, the goal or mission of the total system is subverted--the car will not run properly.

a. Using the same analogy, an installation or organization can be viewed as a system. Like an automobile, an installation is a group of interrelated parts and, again like an automobile, it has a goal or mission.

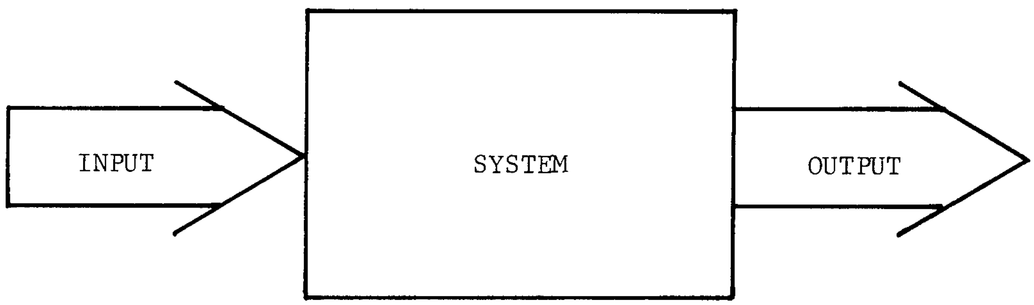


FIGURE 9

b. As you can see in figure 9, an installation has an input of "resources," which is all the people, money, and material an installation commander has at his dispoal. An installation also has output--the goal or mission to be accomlished by that installation commander with the resources he has. All installations have this input and output aspect; with a given amount of resources, an installation commander is to accomplish a given mission.

c. To take a more in-depth look at the idea of an installation as a system, let's suppose that General Smith has just taken command at Fort X. General Smith has been given a mission to accomplish, and depending on the installation, it may be a certain number of combat soldiers trained per year, it may be so many units of ammunition manufactured per month, or it may be some other mission; but General Smith knows before he actually arrives at Fort X what it is he is to accomplish with his new command. This mission is the output when viewing Fort X as a system. When General Smith arrives at Fort X, he will want to know how much money he is to be allowed to spend to perform his mission, how many people he may have to accomplish his mission, and what material the Fort now has with which to reach his goal of mission accomplishment. In other words, General Smith will need to know what input he has into the installation or system in order to successfully arrive at the output of mission accomplishment. With these two sets of information, General Smith is ready to design his resources into what he believes is the best, most efficient way to reach his goal.

d. Therein lies a commander's responsibility--to take what he has and design it so that he most efficiently and economically accomplishes his mission. The words efficient and economic are keywords in a commander's task. A child can accomplish the mission of an installation if given unlimited resources and time, but a child probably cannot accomplish the same mission efficiently and economically.

5. THE US ARMY INSTITUTE OF ADMINISTRATION (USAIA) SYSTEMS MODEL. Since the design of the system is so important in efficiently and economically accomplishing the mission, the USAIA System Model shown below (figure 10) gives a more detailed look at the arrangement of the parts.

a. The first thing to be determined when designing an installation to perform a total mission is to decide what "TASKS" need to be done. The Army or any other organization designs its installation or business in this manner, a list of duties or tasks are determined, all of which are necessary to accomplish the overall mission. Next, a person or "MAN" is hired to accomplish each of the tasks decided upon. The person hired has to possess certain skills or abilities, those which are considered important to successfully perform the task for which he was hired. But,

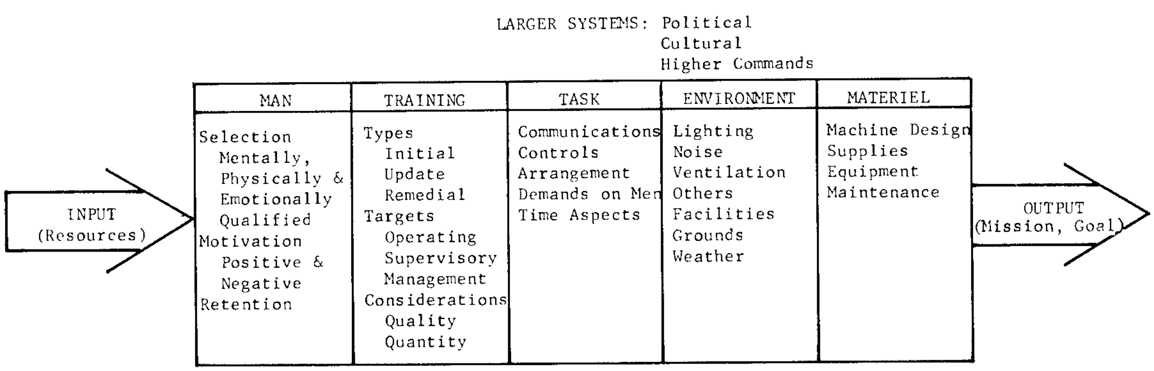


FIGURE 10

after hiring the person, it is usually necessary to give the employee additional "TRAINING" so that he knows not only general duties but those that are specific to "this-job-in-this-place." Once the person has been trained to perform his specific job, he is placed in the "ENVIRONMENT" in which he is to do the job and given the "MATERIEL" necessary for him to perform.

b. When an installation, or any organization, is thus viewed as a system, it is easy to see that something may go wrong in the design of that system. For instance, perhaps the "TASK" originally was designed poorly, perhaps the demands on the person to perform the task are in error or the time given the person in which to perform the task is inadequate. Or, perhaps the way the task is arranged makes it difficult for any person, no matter how well trained, to perform it. It is easy to see that sometimes an error or <u>defect</u> can erroneously be built into a job, thereby making it difficult to perform at all, let alone perform safely.

c. Other sections of the systems model can also develop defects. The "PERSON" selected for the task can, perhaps, be mentally, physically, or emotionally unable to perform the task. Or, the person may not be motivated, either positively or negatively, to do the job for which he was hired. Another problem which sometimes occurs, probably more frequently with military personnel, is that of retention. A young military officer is assigned for a brief time to a particular job and before he can learn it well, he is rotated to another position. All of these problems can and sometimes do create <u>defects</u> in the efficient and economic design of the system.

d. Several defects that creep into the "TRAINING" aspect of the system are: the wrong type of training was given the person, perhaps the employee was given initial training but did not receive the update training required to keep him at the top level of proficiency, or, perhaps he did not quite reach the proficiency needed in the initial training and, therefore, should have received remedial training. Sometimes the training itself was excellent but it was aimed at the wrong group, the supervisors were trained when it should have been operating personnel, or perhaps both supervisors and operators were trained, but managers were not and should have been. Another problem with training is the quality versus quantity aspect. It sometimes happens that the quality of training was excellent but it was too short or too long to bring the trainees to the level of proficiency needed. Even assuming, for the moment, that the "TASK" was well designed and that the "PERSON" selected to perform the task was an excellent choice, these errors in training the employee can lead to defects in the system/installation which can cause losses of one kind or another.

e. Defects can also occur in the "ENVIRONMENT" aspect of the system design. Perhaps the lighting or ventilation is inadequate when performing a task, or the noise level is too high. Sometimes weather is a big factor when doing a job and the employee can do his job beautifully in one climate but cannot do it at all in another. The way the installation grounds and facilities were originally built or laid out can sometimes make it extremely difficult for an employee to do his job in an efficient, safe manner. These problems, and others you may think of, create defects in the installation/system.

f. A big problem area within the system is frequently that of "MATERIEL." The supplies and equipment given the person to perform his task are sometimes poorly designed or, even more often, poorly maintained. In order to do a job well, an employee must be given properly designed and maintained equipment and supplies, but all too frequently, because of budget restrictions, or other reasons, he is not. Then, a defect exists in the "MATERIEL" aspect of the system.

6. SYSTEMS DEFECTS IN ACCIDENT CAUSATION. Let's take another look at the Institute Causation Model to reexamine exactly how the system defect concept fits into accident causation.

a. Under the Heinrich causation model, unsafe acts/conditions were given as the only explanation for accidents; therefore, the only corrective action open to the safety professional was a kind of scurrying about trying to correct unsafe conditions and conducting publicity campaigns against specific unsafe acts. However, now look at the tremendous leverage the safety professional has! Instead of spotting individual trees ("This operator should wear goggles," "This machines needs a guard," "That operator should have some training before being changed to a new machine," etc.), now the safety manager can look at the entire forest to see problems. Not only does this perspective increase the effectiveness of any safety measures he designs, it also places him squarely on the management team. Management level persons look at broad objectives and goals, problems and procedures; consequently, when the safety professional stops fighting individual problems and starts <u>managing</u> by looking at a broader spectrum of the organization, he becomes a safety manager. One of the big complaints among safety professionals in the past has been that the commander (or president in private industry) didn't listen to them. Well, of course he didn't--he was viewing his organization as a system, a set of interrelated parts, a broad whole, and too often the safety professional was talking with him about individual circumstances. ("Sir, I can't get guys in the Facilities Engineers to wear safety goggles when they're drilling in cement.") As you can see, that is not a management level problem; and so the safety man was viewed as an irritant to the commander, not a helpful member of the management team.

b. Systems defects, then, are weaknesses in the way the system was designed or is operated. Some typical examples of systems defects are: improper assignment of responsibility; creation of an improper climate of motivation; inadequate provisions for training and education of personnel; poor provisions for providing suitable equipment and supplies; improper procedures for selection and assignment of personnel; or, improper allocation of funds.

c. Now that we've established that some accidents might very well be caused by operating error (or unsafe acts/conditions), but that many mishaps occur because there are defects or errors built into the system/organization, and that these defects lead not only to mishaps but also to other inefficiencies within the organization, let's go on to the next steps in the causation model.

d. The next question is "What causes systems defects?" If the system/organization was poorly designed or is improperly operated, why is it that way? The answer, of course, is people. The people who originally designed the system or are now operating it--in other words, the managers of the organization--goofed! The reason why a system defect exists is because of an error on the part of a manager. For some reason, the commander who designed his input-to-produce-his-output made an error, or some other member of the management team made a mistake in the way he designed his area of responsibility and therefore a defect crept into the system. Perhaps the original design was excellent but, for whatever reason, the way the subsystem is operated is faulty, and once again, systems defects exist. There are any number of reasons why management errors come about. The manager was simply incapable of designing or operating an effective system; although we don't like to admit it, there are instances of persons being put into management positions who should never have been allowed to manage--they are simply incompetent! A person who is in over his managerial head cannot design or operate an efficient system. Another reason might be that the person lacked knowledge or training; he has the ability but again, he is in over his managerial head because of lack of experience. Another reason, frequently overlooked, is that the manager is not motivated to either design or operate an efficient system. Unfortunately, some managers have reached the stage of on-the-job-retirement--they're on the job physically but mentally they have already retired. They are putting in time until they can really retire; in the meantime, they are neither interested in nor enthusiastic about doing any job. But, whatever the reason for the manager's error, that error does allow a systems defect to develop.

e. To take a look at "where-we-are" in the Institute Accident Causation Sequence, a "RESULT," whether major or minor, is caused by a "MISHAP" which is almost always caused by an "OPERATING ERROR," but "OPERATING ERRORS" are frequently caused by a "SYSTEMS DEFECT," an error in the organization which has developed because some manager goofed--a "MANAGEMENT ERROR." In organizations without a safety staff, the answer to the question "Why did the manager make the error?" could be "He may have been poorly supported by the safety program." And, it's only a hop-skip-and-jump to the next question and answer. He was poorly supported by the safety program because the safety program was inadequately designed to aid him, and <u>who</u> designed the safety program? Correct--the safety professional.

f. Now we can trace the accident causation model from left to right. Because the safety manager goofed in designing an effect program (SAFETY MANAGEMENT ERROR) a SAFETY PROGRAM DEFECT developed. Because there was a defect in the safety program, a manager made an error in either designing or operating his system (MANAGEMENT ERROR) and therefore allowed a SYSTEMS DEFECT to creep into his area of responsibility. The system defect, in turn, led to OPERATING ERRORS and these operating errors allowed the possibility of MISHAPS to occur. And, the mishaps which did occur led to the RESULT, whether major or minor.

g. At first reading, this may well sound like the "For want of a nail the kingdom was lost" sequence and perhaps it is; but upon reflection, it is possible to see that the Institute Causation Model opens <u>eight</u> avenues through which to initiate countermeasures, instead of the one area allowed under the Heinrich Model. In fact, there may now be so many effective countermeasures open for the safety manager that a major problem becomes selecting the best total combinations consistent with available resources. This problem of designing an effective countermeasures program is discussed in detail elsewhere.

Section III. THE SAFETY MANAGERS ROLE

7. SAFETY PROFESSIONAL TASKS. A safety professional who is basing his corrective actions on the two previous concepts described--The USAIA Accident Causation Model (figure 10) and the Systems Model (figure 9) of an installation--is going to be doing things much differently than the safety person who tries to get individual unsafe acts/unsafe conditions corrected. Number one, he will have to be more of a manager and much less of a doer and, number two, he will not be designing and initiating the same types of corrective actions. In order to fully understand the new role of the safety manager, the Institute has designed a model which depicts what the safety manager does during his forty-hours-plus of working time per week (figure 11).

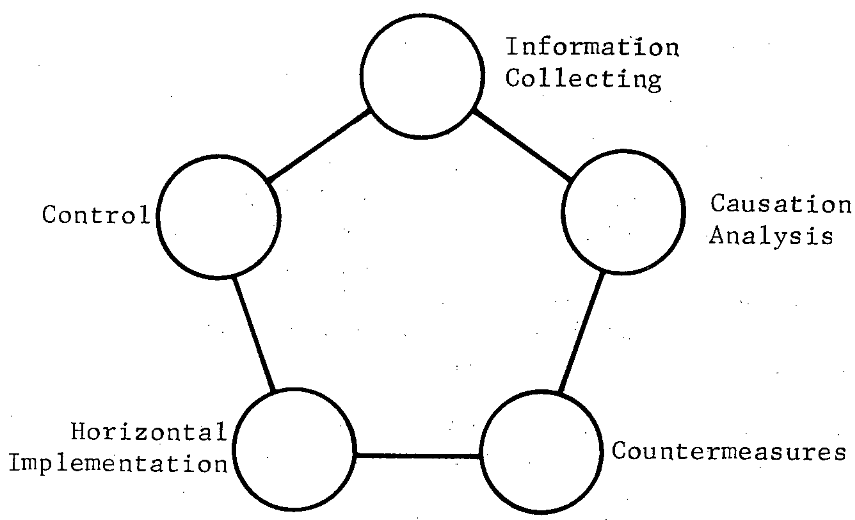


FIGURE 11

8. INFORMATION COLLECTING. In order to effectively design and operate a safety program, the safety manager, like other managers, must know what is happening throughout the organization. (A retired general once confided that his biggest headache while serving as a commander was trying to find out what was really going on; so many people, he said, tell a commander what they think he wants to hear, not what he needs to know.) A good safety manager, probably more than any other person on the staff, needs to know what is happening throughout the organization. Other staff personnel need to know only what is happening within their own area of responsibility but the safety manager's area of responsibility is the entire installation; therefore, his area of knowledge must be extensive. In other words, he must have a very good information collection system; he must design and manage a system whereby he knows what has happened, what is happening, and what can reasonably be expected to happen in the future.

9. ANALYSIS. Raw information is of no value. The information gathered, no matter how extensive that gathering has been, is useless unless it is correlated and analyzed into intelligent groups of relevant data. The second major task of the safety manager is termed causation analysis, looking for trends and patterns among raw information in order to design the best countermeasures possible.

10. COUNTERMEASURES. There are sometimes so many countermeasures possible to combat specific safety problems, that it becomes a major managerial task of the safety manager to pick those which are more effective and most economic, those that give the most return for the investment of time and money. Designing and putting into effect good countermeasures for problems in the installation/system is a major component in the safety manager's time.

11. HORIZONTAL IMPLEMENTATION. Putting countermeasures into effect leads to the next major task of the safety manager--the horizontal implementation of those countermeasures. The Army Safety Program is designed to be operated horizontally; i.e., each manager on the staff is responsible for the safety and well-being of resources within his own area of responsibility. Although there is a full-time safety expert on the staff, he usually does not have directive authority throughout the organization. He is an advisor to the commander and to other staff elements on how best to design either the entire system/installation or different sections of the system in order to meet safety requirements. Consequently, an important task of the safety manager is getting things done

through other staff elements, serving as an expert advisor on technical safety matters to other staff personnel who, presumably, have the expertise necessary to design their area of responsibility so that the safety and well-being of all their resources are adequately covered. It is possible to fall flat on your safety managerial face here. A safety manager may have excellent information collection and analysis systems and may be able to design the most effective and efficient countermeasures possible, but if he cannot sell other managers on his plans, he is totally ineffective and loses control of his entire program.

12. MANAGING THE PROGRAM. The tasks of a safety manager fall into one of the categories discussed above during his forty-hours-plus each week. He is collecting or analyzing information, designing countermeasure programs, getting the countermeasure programs into effect through other staff members, or he is controlling his program and assessing how it is going and what is needs. In other words, he is _managing_, not conducting, a safety program.

Section IV. SUMMARY AND CONCLUSION

13. SUMMARY. The material presented through the rest of this publication will be based on the concepts presented here. The concept of viewing an organization as a system; the US Army Institute of Administration Accident Causation Model which introduces the concept of systems defects and management errors; and the concept of the role of the safety professional as a designer and manager of a safety program, a "get-things-doner," not "a doer." Some key points are:

a. Mishaps result from hazardous situations created by operating errors.

b. Operating errors are caused by two factors--personality defects of people caused by their social environment and ancestry, about which we can do very little; and systems defects, about which we can do a great deal.

c. Systems defects develop because the system designers (managers) made errors in the design or operation of the subsystem for which they have responsibility.

d. The duty of the safety manager and his staff is to advise managers on the design and operation of safety aspects within the system for which the managers are responsible.

e. The actual day-to-day duties of an installation safety manager fall into one of the following categories: Collecting information, analyzing information into meaningfull data, designing effective countermeasure programs, putting those countermeasures into effect through horizontal implementation, and controlling the safety program by managing it and seeing its weaknesses.

14. CONCLUSION. In conclusion, the safety manager should view his organization or command as a system of interrelated parts and should design a safety program which advises management on ways to prevent or eliminate the defects within the system which cause operating errors. The safety manager's job is not to eliminate accidents, not to eliminate operating errors, but rather to eliminate the management-rooted causes of operating errors. This is indeed a new and more viable designation of the safety manager's responsibility and effort.

APPENDIX A

OUTLINE OF A MODEL SAFETY PROGRAM

The program outlined below is intended to produce the six contributions of which a safety program is capable. In each case a goal state is specified, followed by a brief task listing and suggested tactics for task accomplishment.

MISSION PROTECTION

Goal: Key missions have been identified and the potential accident threats to each identified. Control measures have been instituted consistent with cost and mission limitations.

TASK	TACTIC
1. Identify key missions	1. a. Examine mission statements. b. Consult with staff sections.
2. Identify potential accident threat to key missions.	2. Systems analysis.
3. Control measures.	3. a. Hazard control plans developed. b. Control measures monitored.

DAMAGE CONTROL

GOAL: An efficient system for detection of accidental property damage incidents is in place. Damage incidents are being logged and analyzed for their causes. Notifications of these causes are being provided to responsible staff or line sections and corrective action is being monitored.

TASK	TACTIC
1. Detection of property damage losses.	1. 2407; DFAE Work Order; Inspection
2. Analysis	2. Logging and Analysis
3. Notification	3. Normal Staff Procedures
4. Monitor Progress	4. Project Review System

LIABILITY LIMITATION

GOAL: Existing and potential legal vulnerabilities are determined. Appropriate liability-reducing measures are in place and are being periodically monitored.

TASK	TACTIC
1. Identify areas of legal vulnerability.	1. Coordinate with JAG.
2. Devise program for each area of vulnerability.	2. Coordinate with JAG.
3. Implement and control program.	3. Coordinate with JAG.

MANAGEMENT IMPROVEMENT

GOAL: All data is being systematically analyzed to determine the management deficiencies causing hazards and accidents. When found these management problems are verified, documented, and presented to the appropriate staff sections. The safety function is monitoring action taken on the problems.

TASK	TACTIC
1. Analysis	1. Use of systems analysis.
2. Verification and documentation.	2. Use of information system.
3. Development of remedial suggestions.	3. All available resources; use own and other Army safety expertise, references, etc.
4. Communication with concerned staff.	4. Normal staff procedures.
5. Monitoring and controlling.	5. Measurable standards program. Special audits.

INJURY PREVENTION

GOAL: Education, motivation, and engineering countermeasures have been developed and are being implemented. Measurable standards have been instituted and programs are being montiored.

TASK	TACTIC
1. Design program in three major areas.	1. Evaluate existing systems and means for reaching goal.
2. Establish responsibilities and accountability.	2. Phase new programs into existing structures.
3. Monitor performance.	3. Set standards.

OSHA COMPLIANCE

GOAL: OSHA requirements are identified and are being coped with on a timely, efficient basis. The compliance effort has been integrated with major safety program elements for maximum effect and efficiency.

TASK	TACTIC
1. Identify requirements.	1. Review requirements and list as tasks.
2. Build systems to achieve compliance.	2. Systems analysis of each requirement.
3. Integration with existing requirements.	3. Planned integration with existing program.